Refining element

This invention relates to refiners of disc-type with refining discs rotating opposedly relative to one another. The refining discs are provided with refining elements, which between themselves form a refining gap with a refining zone for the working of fibrous material. The fibrous material preferably is lignocellulosic fibrous material, and the refiner is used for the manufacture of, for example, reject pulp, recycled fiber pulp and mechanical pulps, such as board pulp, thermomechanical pulp (TMP) and chemi-thermomechanical pulp (CTMP) and for the low concentration refining of chemical pulps.

The invention relates, more definitely, to a refining element to be used in a refiner of the kind described above.

A refining element is formed with a pattern of bars and intermediate grooves. The bars and grooves are formed in different ways, depending on which fibrous material is worked and which working degree, and thus in the case of lignocellulosic material, which pulp quality is desired. The bars, for example, can be continuous or discontinuous and be arranged in different patterns. The working of the fibrous material is carried out substantially by the bars of the refining elements. The refining gap is formed so that the fibrous material, seen in radial direction, shall pass from the inside outward. Farthest inwardly in the refining gap, in an inner portion, the in-feeding zone, the refining elements normally are formed with wide bars (coarse pattern) for bringing about a first disintegration of the material and for advancing the material outward in the refining gap. A certain defibering, i.e. a separation of the fibers of the material, also takes place in the inner portion of the refining gap where the distance between the refining surfaces is the greatest. The refining gap decreases thereafter outward, i.e. the distance between the opposed refining surfaces decreases and transforms to a refining zone, at the same time as the bars become thinner (finer pattern), in order to achieve a desired working or refining of the fibrous material. The bars in the outer portion are placed at a greater density, which implies more bar edges for effecting the main working of the material. The outer portion can comprise more zones, in which case the pattern usually is made tighter from one zone to the other, radially outward.

In the transition from the inner portion with the coarse pattern to the outer portion with the finer pattern, the material is slowed down. This implies compression of the material and increased load on the bars of the refining element in this position. As a result thereof the bars of the refining element in the transition between the inner and outer portion of the refining element are subjected to increasing wear.

The present invention offers a solution of the aforesaid problem. According to the invention, the transition between the inner and outer portion of the refining element is formed with arc-shaped varying radial distance from the inner edge of the refining element. Thereby the transition of the material from the in-feeding zone to the refining zone is distributed over a greater area of the refining element, and the problem of wear is reduced substantially.

The characterizing features of the invention are defined in the claims.

The invention is described in greater detail in the following with reference to the accompanying Figures illustrating an embodiment of the invention.

Fig. 1 shows the front side of a refining element with a pattern of bars and intermediate grooves,

Fig. 2 is a cross-section according to A-A in Fig 1,

Fig. 3 is a cross-section (B-B) of the bars in the outer portion of the refining element,

Fig. 4 is a cross-section (C-C) of the bars in the inner portion of the refining element.

In Fig. 1 a refining element 10 is shown, which is intended for the refining of fibrous material. The refining element 10 is provided with a pattern of bars and intermediate grooves and is divided into an inner portion 11 and an outer portion 12. The inner portion 11 has a coarse pattern with wide bars 13 while the outer portion has a fine pattern with narrow bars 14. The transition between these portions is designated by 15.

The bars 13 in the inner portion 11 of the refining element are intended to bring about a first disintegration of the material and to advance the material outward in the refining

gap. A certain defibering, i.e. separation of the fibers of the material, also takes place in this portion of the refining element. The bars 14 in the outer portion 12 of the refining element are intended to effect a desired working or refining of the fibrous material.

The transition 15 between the inner portion 11 and the outer portion 12 extends arc-shaped with varying radial distance from the inner edge 16 of the refining element. The refining element suitably is formed so that the distance of the transition 15 from the inner edge 16 increases continuously from one lateral edge 17 of the refining element to the other one 18. But also other configurations of the transition can be imagined. The radial distance from the inner edge 16 can for example increase and decrease one or several times over the refining element. What is essential is that the transition is not located on the same radius over the entire refining element.

The bars 13, 14 suitably are angled in relation to the radius of the refining element, so that during the working of the material they promote an outward feeding. The distance of the transition 15 from the inner edge 16 then shall increase, counted in the intended rotation direction of the refining element.

When refining elements according to the invention is used in a refiner, they are placed directly in front of each other on opposed refining discs (refining element holders) for rotation relative to another. Due to the fact that the transition 15 between the inner and outer portions 11 and 12, respectively, of the refining elements varies radially, the effect of the material on the refining elements at the transition is distributed over a greater area. This implies that the wear is substantially reduced, and the service life of the refining elements increases, and at the same time the feeding will be more uniform and improved. This results altogether in that the operational safety can be improved and the pulp quality be increased.

The invention, of course, is not restricted to the embodiments shown, but can be varied within the scope of the claims with reference to the description and Figures.